REMARKS

Favorable reconsideration of the application is respectfully requested in light of the foregoing amendments and following discussion.

Claims 3-20 are presently pending. Claims 1-2 are canceled herein, Claims 3-7 are amended herein, and Claims 8-20 are added herein.

Please note that the specification has been amended in several places by the present Amendment to correct the spelling of the term "cordierite."

The outstanding Official Action includes: (i) an objection to the IDS filed on January 3, 2000, as not including an indication of relevance; (ii) a rejection of Claims 1-5 and 7 under 35 U.S.C. §102(b) in view of U.S. Patent No. 3,872,582 ("Matsuoka" et al.); (iii) a rejection of Claims 1-5 and 7 under 35 U.S.C. §102(b) in view of U.S. Patent No. 4,692,735 ("Shoji" et al.); and (ii) a rejection of Claim 6 under 35 U.S.C. §103(a) in view of either Matsuoka or Shoji and further in view of U.S. Patent No. 4,835,508 ("Seike" et al.).

Regarding the objection to the IDS filed on January 3, 2000, it is respectfully noted that the IDS was filed with a Statement of Relevancy. For the Examiner's convenience, please find attached to this Amendment a courtesy copy of the previously filed IDS and Statement of Relevancy of January 3, 2000, along with an English language abstract of Japanese Patent Application KOKAI publication no. 7-263204 obtained in response to the Office Action. It is respectfully requested that a copy of the form PTO-1449 initialed by the Examiner be provided with the next Official Communication.

It is respectfully submitted that the §102(b) rejections in view of either Matsuoka and Shoji, and the §103(a) rejection further in view of Matsuoka or Shoji and further in view of Seike are obviated in view of the present amendments.

The present invention provides a nonlinear resistor exhibiting high overvoltage protection performances and extended life under applied voltages, by specifying the end-to-end distance between an end of the electrode and an end of the nonlinear resistor including the side-surface high resistance layer, and at the same time, specifying the material forming the side-surface high resistance layer.

The Matsuoka patent does not disclose that the end-to-end distance in question and the high resistance layer material may cooperatively provide high overvoltage protection performances and extended life under applied voltages. The Matsuoka patent does not even specifically describe the end-to-end distance. Figure 1 of Matsuoka is merely an illustration of a voltage-dependent resistor 10.

Further, the Matsuoka patent does not disclose or suggest the material for forming the side-surface high resistance layer as specified in the claims of the present application now amended. Instead, the Matsuoka patent mentions the following materials for forming the high resistance layer: i) SiO_2 (> 50 mol%) + Bi_2O_3; ii) the same composition as the additive (Bi_2O_3 + CoO, MnO, Sb_2O_3, BaO, SrO and/or BbO);[1] iii) Sb_2O_3 (>30 mol%) + Bi_2O_3; iv) In_2O_3 (>50 mol%) + Bi_2O_3; and v) SiO_2 + Sb_2O_3 + Bi_2O_3.[2]

The Matsuoka patent does not disclose that silicon oxide alone can be used to form the high resistance layer. Further, the use of silicon oxide as one component in each of the compositions i) - v), though containing bismuth oxide, cannot form a glass because they do not contain an additive necessary for forming a glass, such as a boron component and/or an aluminum component. Thus, the Matsuoka patent does not disclose a glass containing bismuth as a main component. In addition, the reference discloses an organic resin such as

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[1]Matsuoka, Col. 3, lines 34-40.

[2]Matsuoka, Col. 3, lines 52-57.

epoxy, vinyl or phenol resin. However, these organic resins are added to the compositions mentioned above merely as a binder which is removed after sintering at 1000 to 1450° C.

Finally, the Matsuoka patent does not disclose the thickness of an electrode. The passage at col. 4, lines 60-65 cited in the Office Action relates to the thickness of high resistance layer.

Regarding the Shoji patent, this document does not disclose that the end-to-end distance in question and the high resistance layer material may cooperatively provide high overvoltage protection performance s and extend ed life under applied voltages. The Shoji patent does not even specifically describe the end-to-end distance. Figure 1 of Shoji is merely a cross-sectional illustration of a nonlinear voltage-dependent resistor.

Further, the Shoji patent teaches that a past having a composition of 1-2.5 mol% Li_2Co_3, 72±5 mol% SiO_2, 20±3 mol% Sb_2O_3, and 8±2mol% Bi_2O_3 is coated to the side surface of the sintered body. The resultant high resistance layer has a composition to the depth of 200μm from the surface of 5-70 mol% of SiO_2, 2-30 mol% of Sb_2O_3, 2-10 mol% of Bi_2O_3, 0.01-5 mol% Li_2Co_3, and 10-90 mol% of ZnO, wherein $Zn_7Sb_2O_{12}$, and Zn_2SiO_4 are formed. This composition is different from the composition specified in claims 8 and 14 of the present application. Further, the reference does not disclose or suggest that silica alone may be used to form the high resistance layer.

The Seike patent does not disclose that the end-to-end distance in question and the high resistance layer material may cooperatively provide high overvoltage protection performances and extended life under applied voltages. The reference does not disclose forming a side-surface high resistance layer.

Accordingly, the Matsuoka patent, the Shoji patent, and the Seike patent, taken either singly or as hypothetical combinations, do not disclose or suggestion the present invention in

view of the foregoing remarks and present amendments. Therefore, withdrawal of the §102(b) rejections and the §103(a) rejection is respectfully requested.

In light of the above, it is respectfully submitted that the claimed invention is patentably distinguishable from the applied documents. Consequently, no further issues are believed to be outstanding in the present application, and the present application is thought to be in condition for allowance. An early and favorable action is therefore respectfully requested. In the event other issues arise in the application which may readily be resolved by telephone, the Examiner is kindly invited to contact the undersigned attorney at the telephone number listed below.

Respectfully submitted,

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Amendment Filed on:
May 20, 2002

IN THE SPECIFICATION

Please amend the specification as shown below.

Please replace the paragraph beginning on page 11, line 1, with the following text:

--the crystalline inorganic substance is a crystalline inorganic substance containing Zn-Sb-O as a constitutional component; a crystalline inorganic substance containing Zn-Si-O as a constitutional component; a crystalline inorganic substance containing Zn-Sb-Fe-O as a constitutional component; a crystalline inorganic substance containing Fe-Mn-Bi-Si-O as a constitutional component; a crystalline silica (SiO_2); alumina (Al_2O_3); mullite ($Al_6Si_2O_{13}$), [cordilight] cordierite ($Mg_2Al_4Si_5O_{18}$), titanium oxide (TiO_2), or zirconium oxide (ZrO_2);--

Please replace the text on page 26, line 1, with the following text:

--[cordilight] cordierite ($Mg_2Al_4Si_5O_{18}$),--

Please replace the paragraph beginning on page 27, line 26, with the following text:

--a side-surface high resistance layer 3 having a [cordilight] cordierite ($Mg_2Al_4Si_5O_{18}$)-containing aluminum phosphate based inorganic adhesive agent as a main component.--

Please replace the paragraph beginning on page 30, line 13, with the following text:

--a side-surface high resistance layer 3 containing [cordilight] <u>cordierite</u> ($Mg_2Al_4Si_5O_{18}$) as a main component;--

Please replace Table 1 beginning on page 38, with the following new table 1.

Table 1

Relationship between material of side surface resistance layer/overvoltage protective performance ability of loaded lifecycle.

Sample No.	Classification of side surface high resistance layer	First side surface high resistance layer	Second side surface high resistance layer	Destruction energy (J/cm^3)	IR_{0h}/IR_{1000h}
1	Inorganic polymer	Mullite-containing aluminum phosphate based inorganic adhesive agent		850	0.93
2		Alumina-containing aluminum phosphate based inorganic adhesive agent		800	0.91
3		Silica-containing aluminum phosphate based inorganic adhesive agent		800	0.89
4		[Codelight]Cordierite-containing aluminum phosphate based in organic solvent		850	0.87

Please replace the Table 1 on page 41, with the following Table:

Table 1

Relationship between material of side surface resistance layer/overvoltage protective performance ability of loaded lifecycle.

Sample No.	Classification of side surface high resistance layer	First side surface high resistance layer	Second side surface high resistance layer	Destruction energy (J/cm^3)	IR_{0h}/IR_{1000h}
22	Crystalline inorganic substance	Fe-Mn-Bi-Si-O crystalline inorganic substance		800	0.87
23		Fe-Mn-Bi-Si-O crystalline inorganic substance + Zn-Sb-O crystalline inorganic substance		850	0.89
24		Crystalline silica		800	0.86
25		Alumina		800	0.85
26		Mullite		850	0.87
27		[Codelight] Cordierite		800	0.89
28		Titanium oxide		800	0.88
29		Zirconium oxide		800	0.89

Please replace the Table 2 beginning on page 46, with the following new Table 2

Table 2

Relationship between material of side surface resistance layer/overvoltage protective performance ability of loaded lifecycle.

Sample No.	Classification of side surface high resistance layer	First side surface high resistance layer	Second side surface high resistance layer	Destruction energy (J/cm^3)	IR_{0h}/IR_{1000h}
55	Combination of two types of side surface high resistance layer	Zn-Si-O crystalline inorganic substance + Zn-Sb-O crystalline inorganic substance	Bi-Zn-B-Si glass	950	0.89
56		Zn-Si-O crystalline inorganic substance + Zn-Sb-O crystalline inorganic substance	Epoxy resin	850	0.93
57		Alumina	Amorphous silica and organosilicate	850	0.89
58		[Mullight] Mullite	Amorphous silica and organosilicate	850	0.95

IN THE CLAIMS

Please amend the claims as follows:

1. (Canceled)

2. (Canceled).

3. (Amended) The nonlinear resistor according to claim [1] 8, wherein a thickness of the side-surface high resistance layer falls within a range of 1 μm to 2 mm.

4. (Amended) The nonlinear resistor according to claim [1] 8, wherein the side-surface high resistance layer is adhered to the sintered body so as to have a shock adhesive strength of 40 mm or more.

5. (Amended) The nonlinear resistor according to claim [1] 8, wherein a material of the electrode is selected from the group consisting of aluminum, copper, zinc, nickel, gold, silver, titanium and alloys thereof.

6. (Amended) The nonlinear resistor according to claim [1] 8, wherein an average thickness of the electrode falls within a range of 5 μm to 500 μm.

7. (Amended) A method of forming a nonlinear resistor according to claim [1] 8, comprising:

forming a side-surface high resistance layer at a side-surface of a sintered body containing zinc oxide as a main component; and

forming an electrode at upper and lower surfaces of the sintered body,

wherein the electrode is formed by a method selecting from the group consisting of plasma spraying, arc spraying, high-speed gas flame spraying, screen printing, deposition, transferring, and sputtering.

Claims 8-20 (New).